OLD HOLLAND CITY LAKE

Dubois County

2007 Fish Management Report

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EXECUTIVE SUMMARY

- A general survey was conducted on June 4 and 5, 2007. Submersed aquatic vegetation was sampled on July 24.

- The Secchi disk depth was 4.3 ft and DO concentrations were marginal for fish survival below 8.0 ft. The conductivity was 324 μS.

- Submersed vegetation was found at 92% of the littoral sites to a maximum depth of 5.0 ft. Two native species, coontail and a naiad sp., and two non-native species, Eurasian watermilfoil and curlyleaf pondweed were collected. Eurasian watermilfoil occurred most frequently (37%), followed by coontail (17%), and naiad sp. (10%).

- A total of 240 fish, representing four species, was collected that weighed an estimated 93 lbs. Largemouth bass ranked first by number (63%), followed by bluegill (24%), and redear sunfish (12%). Largemouth bass ranked first by weight (79%), followed by redear sunfish (13%), and bluegill (8%).

- Largemouth bass growth was good for ages 1 to 4 and slow for ages 5 to 7. Bluegill grew fast, with age-2 and age-4 fish averaging 5.0 and 7.5 in.

- The bass population is starting to stockpile as shown by their growth and abundance. Bass growth is starting to slow around age 4, while age-5 bass are nearly 2.0 in below the district average. Bass abundance is high with an electrofishing catch rate of 296.0/h and a relative abundance by number of 63%. However, at this time no management changes are recommended because the bluegill and bass PSD's are in the "balanced" range, bluegill growth is good, and bass growth is good through age 4.

- It is recommended that a supplemental survey be conducted on Old Holland City Lake in 2009 to monitor the bass and bluegill populations.

INTRODUCTION

Old Holland City Lake is a 13.7-acre impoundment located in Dubois County in the Town of Holland. The shoreline consists of city park grounds that contain restrooms, baseball fields, tennis courts, a walking trail, and basketball courts. The lake serves as the town's secondary water source. Boat access is provided by a concrete boat ramp and most of the shoreline is available to bank fishing. A $15.00 annual city boat launching permit is required to use the boat ramp. The launching permit is $10.00 for residents of Holland. The launching permit also includes boat access to New Holland City Lake. No outboard motors are permitted.

Numerous fish management practices have occurred since 1980. Channel catfish were stocked in 1980, 1985, and 1989. A supplemental bluegill and redear sunfish fingerling stocking occurred in 1990 due to a fish kill in January 1990. A combined total of 212 largemouth bass were removed from the lake in 1998 and 1999 to improve the predator-prey balance. The 2001 and 2004 surveys showed that the bass removal was successful at bringing the predator-prey proportion back to appropriate levels with bluegill outnumbering bass.

METHODS

A general survey was conducted on June 4 and 5, 2007. Some of the lake's physical and chemical characteristics were measured. Submersed aquatic vegetation was sampled on July 24 using guidelines written by the Indiana Department of Natural Resources (2006).

Fish collection effort consisted of pulsed DC night electrofishing with two dippers for 0.50 h, one trap net lift, and two experimental-mesh gill net lifts. All fish collected were measured to the nearest 0.1 in TL. Average weights were estimated by using the Fish Management District 7 averages. Scale samples were taken from a subsample of game fish for age and growth analysis. Proportional stock density (PSD) and relative stock density (RSD) indices were calculated for largemouth bass and bluegill (Anderson and Neumann 1996). The bluegill fishing potential index (BGFP) was used to classify the quality of the bluegill fishery (Ball and Tousignant 1996). All sampling was done in accordance with the Division of Fish and Wildlife sampling guidelines (Shipman 2001).

RESULTS

Old Holland City Lake has a maximum depth of 18.0 ft. The Secchi disk depth was 4.3 ft and DO concentrations were marginal for fish survival below 8.0 ft. The conductivity was 324 µS.

Submersed vegetation was found at 92% of the littoral sites to a maximum depth of 5.0 ft (Figure 1). Two native species, coontail and a naiad sp., and two non-native species, Eurasian watermilfoil and curlyleaf pondweed were collected. Eurasian watermilfoil occurred most frequently (37%), followed by coontail (17%), and naiad sp. (10%). Filamentous algae was found at 30% of the sites. Emergent species observed were creeping water primrose, bulrush sp., and cattail sp.

A total of 240 fish, representing four species, was collected that weighed an estimated 93 lbs. Largemouth bass ranked first by number (63%), followed by bluegill (24%), and redear sunfish (12%). Largemouth bass ranked first by weight (79%), followed by redear sunfish (13%), and bluegill (8%). One yellow bullhead was also collected. Species collected in past surveys include white crappie, green sunfish, brown bullhead, channel catfish, flathead catfish, and golden shiner.

A total of 152 largemouth bass was sampled that weighed 73 lbs. They ranged in length from 1.5 to 16.4 in. The catch rates were 296.0/electrofishing h, 2.0/trap net lift, and 1.0/gill net lift. The 2004 electrofishing catch rate was 300.0/h. Largemouth bass growth was good for ages 1 to 4 and slow for ages 5 to 7. An age-3 bass averaged 11.4 in while an age-5 bass averaged 13.0 in. Bass growth in 2004 was average for all ages.

The bass PSD increased from 16 (2004) to 49. The suggested PSD range indicating a balanced largemouth bass fishery is 40 to 70 (Anderson and Neumann 1996). The RSD-14 was 6 and was similar to 2004 results.

A total of 58 bluegill was sampled that weighed 8 lbs. They ranged in length from 2.6 to 8.6 in. The catch rates were 104.0/electrofishing h, 4.0/trap net lift, and 1.0/gill net lift. The electrofishing catch rate in 2004 was 300.0/h. Bluegill were growing fast with age-2 and age-4 fish averaging 5.0 and 7.5 in. Bluegill growth was also fast in 2004.

The bluegill PSD decreased from 60 (2004) to 29. The suggested PSD range indicating a balanced bluegill fishery is 20 to 60 (Anderson and Neumann 1996). The bluegill RSD-7 was 29

and RSD-8 was 4. These slightly decreased from 2004. The BGFP index was nearly identical to 2004 and classified the lake as having "good" bluegill fishing with an index rating of 25.

Twenty-nine redear sunfish were sampled that weighed 12 lbs. They ranged in length from 2.9 to 10.9 in. The catch rates were 54.0/electrofishing h, 2.0/trap net lift, and 0.0/gill net lift. The electrofishing catch rate in 2004 was 168.0/h. Redear sunfish growth was good to fast for all ages, with an age-4 redear averaging 8.8 in.

DISCUSSION

Old Holland City Lake provides good fishing for bluegill and redear sunfish. Bluegill were collected up to 8.6 in and redear up to 10.9 in. Largemouth bass are abundant, but most are under 14.0 in. Although bluegill growth was good, the PSD and electrofishing catch rate were less than half of the 2004 values. Only 24% of bluegill collected were at least 7.0 in versus 40% in 2004. The lower number of bluegill over 7.0 in may be due to a combination of increased harvest and poor recruitment caused by predation from the large bass population.

The bass population is starting to stockpile as shown by their growth and abundance. Bass growth is starting to slow around age 4, while age-5 bass are nearly 2.0 in below the district average. Bass abundance is high with an electrofishing catch rate of 296.0/h and a relative abundance by number of 63%. However, at this time no management changes are recommended because the bluegill and bass PSD's are in the "balanced" range, bluegill growth is good, and bass growth is good through age 4.

The lake's management history has shown that a bass removal would benefit the fishery if bass growth and bluegill abundance continues to decline. The fishery should be resurveyed in 2009. The objective of the supplemental survey would be to determine if a bass removal is necessary to improve fishing. The survey should be conducted in early April and target largemouth bass and bluegill.

RECOMMENDATIONS

- Conduct a supplemental survey in 2009 to monitor the bass and bluegill populations.

LITERATURE CITED

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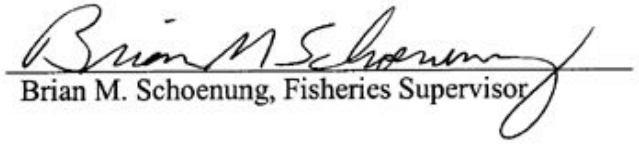
Submitted by: Michelle L. Weinman, Assistant Fisheries Biologist

Date: August 21, 2007

Approved by: Daniel P. Carnahan, Fisheries Biologist

Date: September 4, 2007

Approved by: 
Brian M. Schoenung, Fisheries Supervisor

Date: November 19, 2007

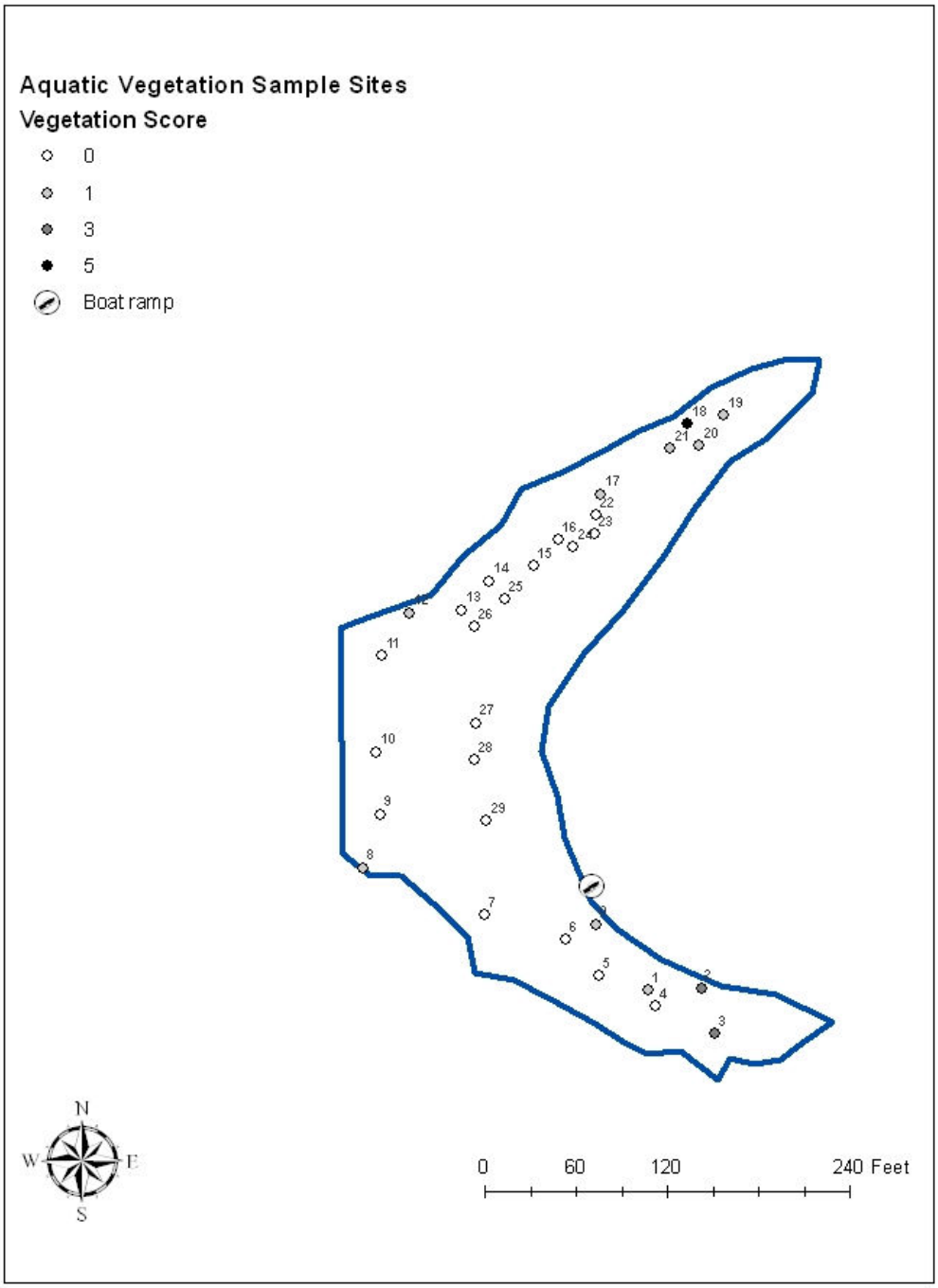


Figure 1. Old Holland aquatic vegetation sample sites and scores, 2007.

APPENDIX
Fisheries Survey Data

LAKE SURVEY REPORT

Type of Survey: [ ] Initial Survey [X] Re-Survey

Lake Name	County	Date of survey (Month, day, year)
Old Holland City Lake	Dubois	June 4 and 5, 2007
Biologist's name		**Date of approval (Month, day, year)**
Michelle L. Weinman		November 19, 2007

LOCATION

Quadrangle Name	Range	Section
Velpen	6W	14
Township Name	**Nearest Town**	
3S	Holland	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site
		City owned boat ramp

Surface acres	Maximum depth	Average depth	Acre feet	Water level	Extreme fluctuations
13.7	18.0	9.0	123.3	491 MSL	None

Location of benchmark

INLETS

Name	Location	Origin
Intermittent stream	Northeast end of lake	Runoff

OUTLETS

Name	Location

Water level control: 8.0 in pipe to New Holland Lake

POOL	ELEVATION (Feet MSL)	ACRES
TOP OF DAM		
TOP OF FLOOD CONTROL POOL		
TOP OF CONSERVATION POOL	491	13.7
TOP OF MINIMUM POOL	482	
STREAMBED		

Bottom type

- [ ] Boulder
- [ ] Gravel
- [ ] Sand
- [X] Muck
- [X] Clay
- [ ] Marl

Watershed use: Park, agriculture

Development of shoreline: City park, beach

Previous surveys and investigations: Fisheries surveys: 1966, 1977, 1980, 1988, 1990, 1991, 1994, 1997, 2001, and 2004.

SAMPLING EFFORT					
ELECTROFISHING	Day hours		Night hours 0.5		Total hours 0.5
TRAP NETS	Number of traps 1		Number of Lifts 1		Total effort 1
GILL NETS	Number of nets 2		Number of Lifts 1		Total effort 2
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color: Motor oil	Turbidity: 4 Feet 3 Inches (SECCHI DISK)
Alkalinity (ppm)*: Surface: 68.4 Bottom:	pH: Surface: 8.9 Bottom:
Conductivity: 324 microsiemens	Air temperature: 78 °F
Water chemistry GPS coordinates: N 38.252183 W -87.040967	

TEMPERATURE AND DISSOLVED OXYGEN (D.O.)								
DEPTH (FEET)	Degrees (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)	DEPTH (FEET)	DEGREES (°F)	D.O. (ppm)
SURFACE	78.9		36			72		
2	78.4	8.5	38			74		
4	78.3	8.1	40			76		
6	77.0	5.9	42			78		
8	71.4	2.4	44			80		
10	63.5	6.1	46			82		
12	57.6	0.4	48			84		
14	53.2	0.2	50			86		
16	50.9	0.2	52			88		
18	50.2	0.2	54			90		
20			56			92		
22			58			94		
24			60			96		
26			62			98		
28			64			100		
30			66					
32			68					
34			70					

COMMENTS

*ppm-parts per million

Occurrence and Abundance of Submersed Aquatic Plants - Overall

Lake:	Old Holland	**Secchi (ft):**	2.0	**SE Mean Species / Site:**	0.19
Date:	7/24/2007	**Littoral Sites w/Plants:**	11	**Mean Natives / Site:**	0.27
Littoral Depth (ft):	5.0	**Number of Species:**	4	**SE Mean Natives / Site:**	0.08
Littoral Sites:	12	**Max. Species / Site:**	3	**Species Diversity:**	0.64
Total Sites:	30	**Mean Species / Site:**	0.70	**Native Diversity:**	0.47

	Frequency of	Score Frequency				
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Coontail	16.7	83.3	13.3	3.3	0.0	4.7
Naiad sp.	10.0	90.0	6.7	3.3	0.0	3.3
Eurasian watermilfoil	36.7	63.3	30.0	3.3	3.3	11.3
Curlyleaf pondweed	6.7	93.3	6.7	0.0	0.0	1.3
Filamentous algae	30.0					

Other species noted:
Creeping water primrose, bulrush sp., cattail sp.

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT					
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)	WEIGHT (pounds)	PERCENT
Largemouth bass	152	63.3	1.5 - 16.4	73.10	78.8
Bluegill	58	24.2	2.6 - 8.6	7.82	8.4
Redear sunfish	29	12.1	2.9 - 10.9	11.71	12.6
Yellow bullhead	1	0.4	6.9	0.18	0.2
Totals	240			92.81	

*Common names of fishes recognized by the American Fisheries Society.

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LARGEMOUTH BASS									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	2	1.3	0.01	not aged	19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0					23.0				
5.5	14	9.2	0.08	1	23.5				
6.0	18	11.8	0.10	1, 2	24.0				
6.5	17	11.2	0.13	1, 2	24.5				
7.0	11	7.2	0.16	1, 2	25.0				
7.5	6	3.9	0.20	1	25.5				
8.0	3	2.0	0.24	1, 2	26.0				
8.5	1	0.7	0.28	2	TOTAL	152			
9.0									
9.5	1	0.7	0.39	2					
10.0	4	2.6	0.46	2					
10.5	11	7.2	0.53	2, 3					
11.0	14	9.2	0.62	3, 4					
11.5	9	5.9	0.71	3, 4					
12.0	15	9.9	0.80	3, 4, 5					
12.5	14	9.2	0.91	3, 4, 5					
13.0	3	2.0	1.02	4					
13.5	4	2.6	1.15	5					
14.0	2	1.3	1.31	5					
14.5									
15.0	1	0.7	1.68	6					
15.5									
16.0	2	1.3	2.08	7					
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	296.0/h	GILL NET CATCH	1.0/lift	TRAP NET CATCH	2.0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF BLUEGILL									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5	5	8.6	0.01	1, 2	20.5				
3.0	6	10.3	0.02	1, 2	21.0				
3.5	2	3.4	0.03	1	21.5				
4.0	3	5.2	0.05	1	22.0				
4.5	5	8.6	0.07	1, 2	22.5				
5.0	14	24.1	0.09	2	23.0				
5.5	6	10.3	0.13	2, 3, 4	23.5				
6.0					24.0				
6.5	3	5.2	0.22	3, 5	24.5				
7.0	5	8.6	0.28	3, 4, 5	25.0				
7.5	6	10.3	0.28	4, 5	25.5				
8.0	2	3.4	0.41	4	26.0				
8.5	1	1.7	0.49	not aged	TOTAL	58			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	104.0/h	GILL NET CATCH	1.0/lift	TRAP NET CATCH	4.0/lift

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF REDEAR SUNFISH									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5	1	3.4	0.02	1	20.5				
3.0					21.0				
3.5	1	3.4	0.03	1	21.5				
4.0					22.0				
4.5	1	3.4	0.07	2	22.5				
5.0					23.0				
5.5					23.5				
6.0					24.0				
6.5	4	13.8	0.22	2, 3	24.5				
7.0	7	24.1	0.27	3, 4	25.0				
7.5					25.5				
8.0	2	6.9	0.40	4	26.0				
8.5	4	13.8	0.48	4, 5	TOTAL	29			
9.0	4	13.8	0.57	4, 5					
9.5	2	6.9	0.66	5					
10.0	1	3.4	0.76	4					
10.5	2	6.9	0.87	5					
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	54.0/h	GILL NET CATCH	0.0/lift	TRAP NET CATCH	2.0/lift

LARGEMOUTH BASS AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3	4	5	6	7
5.5	14	6	14						
6.0	18	7	10	8					
6.5	17	6	11	6					
7.0	11	7	8	3					
7.5	6	6	6						
8.0	3	3	1	2					
8.5	1	1		1					
9.0									
9.5	1	1		1					
10.0	4	4		4					
10.5	11	6		4	7				
11.0	14	6			12	2			
11.5	9	4			4	5			
12.0	15	5			3	6	6		
12.5	14	7			2	8	4		
13.0	3	3				3			
13.5	4	3					4		
14.0	2	2					2		
14.5									
15.0	1	1						1	
15.5									
16.0	2	1							2
Totals	150	79	50	28	28	24	16	1	2

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	50	6.6	0.52	0.10	6.4	6.8
2	28	8.0	3.16	0.33	7.3	8.6
3	28	11.4	0.35	0.11	11.2	11.6
4	24	12.4	0.36	0.12	12.1	12.6
5	16	13.0	0.60	0.19	12.6	13.4
6	1	15.3				
7	2	16.3			16.3	16.3

BLUEGILL AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3	4	5
2.5	5	5	4	1			
3.0	6	5	5	1			
3.5	2	2	2				
4.0	3	2	3				
4.5	5	5	1	4			
5.0	14	10		14			
5.5	6	6		4	1	1	
6.0							
6.5	3	3			2		1
7.0	5	5			1	1	3
7.5	6	6				3	3
8.0	2	2				2	
Totals	57	51	15	24	4	7	7

AGE-LENGTH KEY SUMMARY						
Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	15	3.5	0.43	0.17	3.1	3.8
2	24	5.0	0.52	0.15	4.8	5.3
3	4	6.6	0.40	0.31	6.0	7.3
4	7	7.5	0.74	0.32	6.9	8.2
5	7	7.4	0.14	0.14	7.1	7.7

REDEAR AGE-LENGTH KEY

Length group (in)	Total number	Sub-sample	AGE 1	2	3	4	5
2.5	1	1	1				
3.0							
3.5	1	1	1				
4.0							
4.5	1	1		1			
5.0							
5.5							
6.0							
6.5	4	4		1	3		
7.0	7	7			6	1	
7.5							
8.0	2	2				2	
8.5	4	4				3	1
9.0	4	4				2	2
9.5	2	2					2
10.0	1	1				1	
10.5	2	1					2
Totals	29	28	2	2	9	9	7

AGE-LENGTH KEY SUMMARY

Age	Number	Mean TL	Var	SE	Lower 95%CI	Upper 95%CI
1	2	3.3	0.50	0.50	2.3	4.3
2	2	5.8	2.00	1.00	3.8	7.8
3	9	7.1	0.06	0.08	6.9	7.3
4	9	8.8	0.69	0.28	8.2	9.3
5	7	9.8	0.58	0.29	9.2	10.3

GPS LOCATION OF SAMPLING EQUIPMENT								
GILL NETS			TRAP NETS			ELECTROFISHING		
1	N 38.2534	W -87.0397	1	N 38.2541	W -87.0383	1	N 38.2508	W -87.0389
2	N 38.2507	W -87.0393	2	N	W		N 38.2541	W -87.0389
3	N	W	3	N	W	2	N 38.2532	W -87.0403
4	N	W	4	N	W		N 38.2508	W -87.0396
5	N	W	5	N	W	3	N	W
6	N	W	6	N	W		N	W
7	N	W	7	N	W	4	N	W
8	N	W	8	N	W		N	W
9	N	W	9	N	W	5	N	W
10	N	W	10	N	W		N	W
11	N	W	11	N	W	6	N	W
12	N	W	12	N	W		N	W
13	N	W	13	N	W	7	N	W
14	N	W	14	N	W		N	W
15	N	W	15	N	W	8	N	W
16	N	W	16	N	W		N	W
17	N	W	17	N	W	9	N	W
18	N	W	18	N	W		N	W
19	N	W	19	N	W	10	N	W
20	N	W	20	N	W		N	W
						11	N	W
							N	W
						12	N	W
							N	W
						13	N	W
							N	W
						14	N	W
							N	W
						15	N	W
							N	W
						16	N	W
							N	W
						17	N	W
							N	W
						18	N	W
							N	W
						19	N	W
							N	W
						20	N	W
							N	W